CLIMATE CHANGE AND CHALLENGES IN BIODIVERSITY CONSERVATION WITH SPECIAL REFERENCE TO ANTARCTICA

I. K. Pai
Department of Zoology,
Goa University, Goa-403 206
ikpai@unigoa.ac.in

Abstract

Antarctica, the seventh continent on our planet, though has an area of about 14 million Sq. Km, is one of the least inhabited and lesser known part of our globe. India is one the few countries who have permanent research station in this icy continent and its second station is located at Schirmacher oasis area of east Antarctica. Indian studies on this continent stared in the year 1982 and since then more than 25 expeditions have been undertaken. One of the important field of studies happen to be understanding biodiversity, its density, distribution pattern, survival strategies etc., Though, the continent is popularly known for penguins and other migratory birds, has a moderate faunal diversity, particularly in the freshwater bodies. As far as floral diversity is concerned, a few fungi, lichen and other microbial diversity is available. The paper deals with special reference to zooplankton diversity in fresh water bodies in and around Indian station Maitri. The possible effect of climatic change on these organisms in Antarctica has been discussed.

Introduction

Antarctica, the 'Frozen continent' of the world was not known to the mankind till the beginning of 19th century. Only in 1820 first recording of the sighting of this icy continent was reported. Even after knowing the existence of this continent, the man could step on it only on the 25th January 1895, about 115 years ago. Today, there are about 44 permanent bases of 17 countries. It was on February 3, 1939, while flying in Dornier airplane, piloted by Richardheinrich Schirmacher, over an ice free area, today known as Schirmacher Oasis, Alfred Ritcher already recognised the favorable conditions this area provided for a logistic base for future Antarctic research activity. But not until March 1976, did German scientists (as participants of the 21st Soviet Antarctic expedition) set foot on the rocks of the Schrimacher Oasis, where the Soviet station Novolazarevskaya had already been established in 1961. Schirmacher oasis belongs to the most remarkable landscape features of the Antarctic continent. Due to the lack of perpetual glacier coverage, their climate differs from that of the surrounding permanently glacier covered areas. This results in a number of peculiarities with regards to their hydrology, rock weathering as well as living conditions for animals and 'plants' even lakes do exist in some oases. The specific climate of oases sometimes brings about a complete melting of the lake ice covered in summer (Fritzche and Bormann, 1995). In fact, ice free areas have been known in Antarctica since 1901/04 when Scott's British national Antarctic Expedition discovered the dry valleys in Victoria Land. In Antarctic literature the word 'oasis' was first used in a poetic sense by Stephenson, a member of the British Grahamland Expedition 1934-37, for an ice-free landscape at Alexander Island which he named as Albation camp. Later, in 1947 United States Navy "Operation High Jump" discovered Bunger Oasis. Oases can be classified as low coastal (100-200msl) and mountain oases. Korotkevich (1969) subdivided the group of low oases into typical ones (i.e,. ones situated behind an ice shelf), into coastal oases (without an ice shelf in front of them and ice-free islands (Fritzche and Bormann, 1995). The name Queen Maud land is used for that part of Antarctica which lies between 20°W and 45°E. Originally Hjalmar Riiser Larsen named the coats between 37°W and 50°E which he discovered in 1930 in honor of Queen Maud of Norway. In 1937, the name was transferred to the whole sector claimed by Norway in 1939. Biological data was collected by Soviet field parties in Queen Maud land as well. Aleshinkaya and Bardin (1965), Laverenko (1966) and Bardin (1969) reported algae vegetation from lakes of Shirmacher oasis area. Indian Antarctic program was started in 1981 and India became full member of Antarctic treaty as the first developing Asian country. First Indian expedition reached the Antarctic and landed at Novolazarevskaya ice shelf on January 9, 1982. The freshwater lakes of the Antarctic continent, representing a biological integration of

an entire drainage area, are particularly attractive ecological units for basic study (Pridle and Heywood, 1980). In this area major emphasis has been paid for terrestrial and microbial ecosystems (McInnes and Ellis Evans, 1987). Hence, information of limnetic and glacial biotopes are limited (Suren, 1990). Earliest account of chemical analyses was by Bardin and Leflat (1965) and on the algal production by Komarek and Ruzicka (1966) and later, Ingole and Parulekar (1993) studied limnology of some freshwater lakes in this area.

Materials and Methods

Study site: The Schirmacher oasis, forming a part of Dronning Maud Land is about 90 km south of Prince Astrid coast of east Antarctica. It is an E-W tending low lying range with maximum width of 3.5 km in the central part. It has length of about 20km and total area is about 35 Sq.Km.(Ingole and Parulekar, 1993). The Schirmacher range comprises of a group of low lying hills about 50-200m inter space with a few glacial lakes ranging in size from 0.02 to 0.70Km^2. The catchment consists of barren moraine material and patches of macrophytes in the area. The majority of the lakes are arheic, possessing no outflow and the annual ablation rate is generally balanced by the summer ephemeral inflow of glacial melt streams. 16 such water bodies constituted the sites / materials for the present studies. These bodies were visited between 20th Jan 2001 to 23rd Feb.2001. Microfauna was collected by filtering 20 lit of water from each of these water bodies and the collected material was stored in 4% neutralized formalin to which 1% roe Bengal solution had been previously added. All micro fauna was counted and identified to the taxon level.

Results and Discussion

The results indicated that, out of the 16 fresh water bodies analyzed, Turbellarians were found in 14, Ciliophra and Rotifers were in 13, Insects were in 11 and Tardigrades were present in 10 water bodies (Table-1). Table-2 indicate faunal percentage in these water bodies. Protozoans and dormant eggs constituted larger (36.00% and 30.05% respectively) groups, followed by nematodes (11.00%) Tardigrades (6.20%), Rotifers (2.80%), Oligochaetes (0.90%) and Acardines (0.40%). Data on common species available in the fresh water bodies of Schirmacher oasis is provided in Table-3. Which indicate the presence of Ciliophores (Oxytricha sp.,) Turbellarians (*Neorhabdocoel sp and Kalyptorhynchia sp*), Rotifera (*Philodina sp*), Nematode (*Teratocephalus sp and Plectus sp*) and Tardigrads represented by *Hypsibius sp and Echinoscoids sp etc.*. The results indicate there is a quite a good density and diversity of plankton life in these water bodies. The microfauna found in these lakes are common and distributed widely in Antarctic continental lakes. As these microfauna is adapted to a very special kind of environmental conditions viz., extreme cold conditions over the last thousands of years, any change in the climate will have a profound impact on these organism. Hence, there is need to understand the diversity, density, distribution and other dynamics apart from their physiological activities, genetic variability and evolutionary pattern of these organisms, before they become extinct in the present day's fast changing climate.

Table 1: Dominant Groups

(No of water bodies analyzed was 16)

Groups	Present in
Ciliophora	13/16
Turbellaria	14/16
Rotifera	13/16
Tardigrada	10/16
Insecta	11/16

Table 2: Faunal Percentage

Faunal Groups	Present in
Protozoans	36.00
Dormant eggs	30.05
Nematodes	11.00
Tardigrades	6.20
Rotifers	2.80
Oligochaetes	0.90
Acardines	0.40

Table 3: Common species

Groups	Species
Ciliophores	*Oxytricha sp*
Turbellaria	*Neorhabdocoel sp*
	Kalyptorhynchia sp
Rotifera	*Philodina sp*
Nematoda	*Teratocephalus sp*
	Plectus sp
Tardigrada	*Hypsibius sp*
	Echinoscoids sp
Insecta	*Cryptopygus sp.*

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